Test results - ToF-ERDA

Methods

The four thin film samples were analysed using Time-of-Flight Elastic Recoil Detection Analysis (ToF-ERDA). The analysis was performed with a 30 MeV $^{127}I^{8+}$ beam in a geometry with incident (α) and exit (β) angles of 24° and a scattering angle (θ) of 40°. The count rate on timing gate 2 and the GIC was 100 counts/s, with an approximate beam spot of 6x6 mm.

Additional information

Figure A1: The picture from the camera while carrying out measurement, with the green box showing the beamspot size and position for sample 1.

Results

All elements within the thin film were fully separated and able to be analysed individually. Both the layers were fully visible, with the Si substrate able to be observed in the depth profiles. In all samples, the layer_1 had a stoichiometric ratio of **0.9**. The SiO_2 layer, assuming a density of 2.2 g/cm^3, was around 60 nm for all samples.

Average elemental compositions of the samples were calculated using two different approaches;

1. using all the measured data including surface and interface of the thin film,
2. excluding the surface/interfaces of the thin film.

Results from both approaches are given in **Table 1**. Depth profile figures are shown in **Figure 1**.

Table 1: Average elemental composition of samples.

1) Elemental composition including film interfaces					2) Elemental composition excluding film interfaces				
Sample	**Element**	**at. %**	**Uncertainty (at. %)**	**Total content (10^{15} at./cm^2)**	**Sample**	**Element**	**at. %**	**Uncertainty (at. %)**	**Total content (10^{15} at./cm^2)**
Sample 1	H				Sample 1	H			
	N					N			
	O					O			
	Si					Si			
	Ti					Ti			

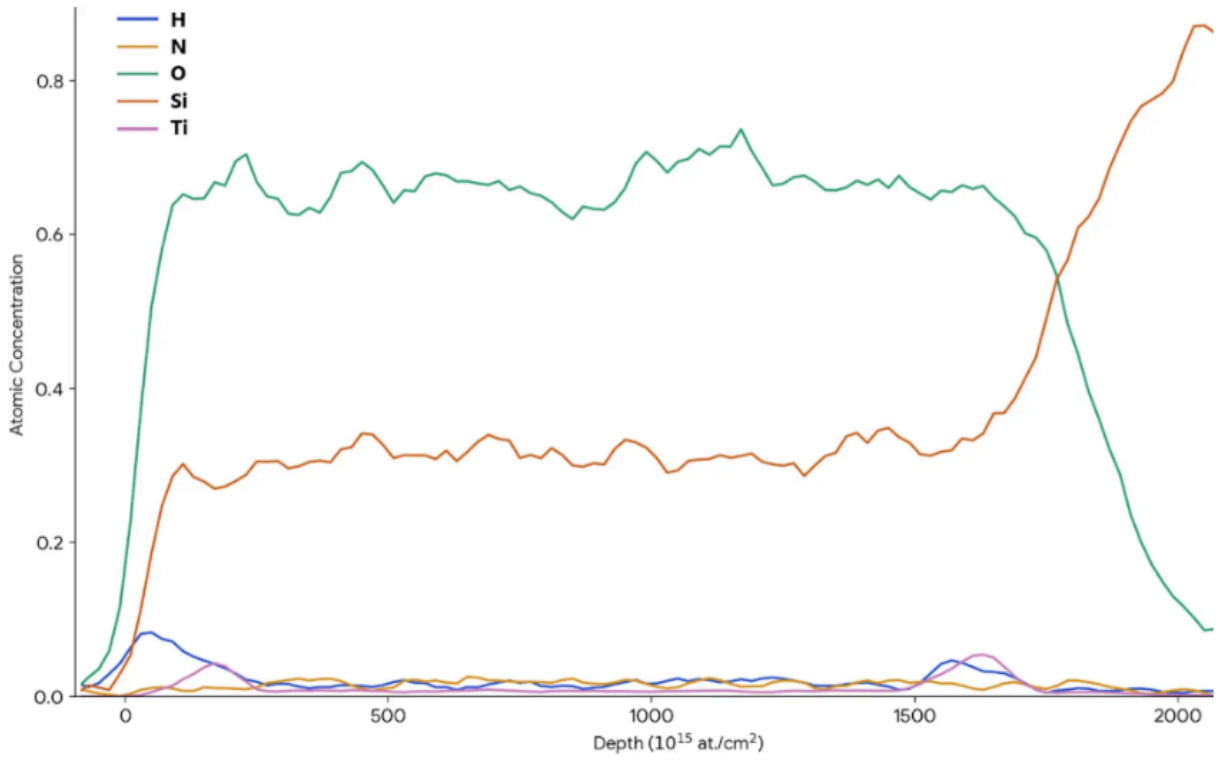

Figure 1: Depth profile of **Sample 1** showing average concentration as a function of depth. There were no composition changes needing to be accounted for during measurement.

End of the test report